Foot and Ankle Injuries in Baseball

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Consultant, Royalities, Research

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No off-label uses of materials are presented during this lecture
Ankle Sprains relatively common in baseball

• The Problem
  – 20-40% suffer chronic pain/disability after significant ligamentous injury
  – 10-30% with functional disability
    • Weakness, loss of proprioception, loss of motion, tendinitis
Types of Ankle Sprains

• Lateral ankle sprains
  – Inversion/plantarflexion mechanism (“classic”)

• Medial ankle sprains
  – Deltoid ligament injury
    • Eversion injury mechanism

• “High ankle sprain”
  – Syndesmosis injury
    • Ext rotation mechanism
    • Increasing incidence
Sprain Types

- Types/mechanism
  - Lateral ankle sprains
    - Inversion/plantarflexion mechanism
  - Medial ankle sprains
    - Deltoid ligament injury
      - Eversion injury mechanism
  - "High ankle sprain"
    - Syndesmotic injury
      - Ext rotation mechanism
      - Increasing incidence
Sprain Types

• Types/mechanism
  – Lateral ankle sprains
    • Inversion/plantarflexion mechanism
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  – “High ankle sprain”
    • Syndesmotic injury
    • Ext rotation mechanism
    • Increasing incidence
Case

- 24 y/o OF with “twisting” injury
  - Tender and swollen medial and lateral
  - Normal x-rays
  - Placed in a boot for 4 days
  - Training room treatments
  - RTP at 7 days
Case

Issues

• Pain persisted
• Functional limitations
• Persistent swelling/effusion
• MRI done
Case

• Continued swelling and discomfort

• Exam “vague” at 6 weeks
  – Chronic swelling
  – Tender over anterior/inferior medial malleolus and lateral
  – Anterior drawer with external rotation
Case

- Test for dynamic instability = “syndesmotic taping”
  - Player asked to perform single limb heel rise with and without tape wrapped around distal tib-fib
  - If tape assists then consider instability and need for syndesmotic fixation

Wolf BR, Amendola
A: *Curr Opin Orthop* 2002
Case

• Intraop exam diagnostic
  – EUA
  – Arthroscopic: medial laxity, syndesmotic instability, OCL
Case

• Intraop repair
  – Chondral debridement
  – Superficial deltoid
    • Medial Brostrom
  – Syndesmotic stabilization
    • Suture-button fixation
Postop

- NWB in splint x 2 weeks and then NWB in cast x 2 weeks
- PWB in boot for 2 weeks and then FWB in boot for 4 weeks
- DF/PF only
- Progressive strengthening after 10 weeks
- RTP at 5 months
Ankle Sprain Summary

• Not all ligament injuries occur in isolation
• Most “lateral” do well with non-op treatment but require comprehensive rehab (peroneals)
• If player not improving think subtle instability (deltoid/syndesmotic) and need for EUA/scope
Plantar Heel Pain
Heel Pain in Baseball

• Plantar
  – Heel pain syndrome
    • Plantar fasciitis
    • Entrapment of 1\textsuperscript{st} branch of LPN
    • Inferior calcaneal bursitis
  – Calcaneal stress fracture
Plantar Fasciitis

- History/Examination
  - Worse after rest or sitting
  - Pain: dull, aching, sharp, “stone-bruise”
  - Max tenderness @ plantar medial heel
  - No pain with lateral compression
  - Often tight Achilles
  - Pes cavus or planus
Plantar Fasciitis

- Radiographs
  - Lapidus- 46% pts no spur, 50% bilat spurs with unilateral pain
  - Really only helpful for calcaneal stress fracture
Plantar Fasciitis

- Imaging studies if exam equivocal and protracted course
  - MRI more specific than bone scan
Plantar Fasciitis

• Treatment Modalities- initial phase
  – Windlass/Achilles stretching
  – Toe flexion strengthening
  – Orthoses/heel cups and cushions
  – Dorsiflexion night splint
  – NSAIDs/icing
Plantar Fasciitis

- Treatment Modalities- secondary phase
  - Physical therapy modalities
  - Boot/Cast
  - Corticosteroid injection
    - Improvement temporary in 30%
    - 30-40% resolve with single injection
Plantar Fasciitis

- Avoid repeat cortisone injections
  - *Fat pad atrophy*
  - *Rupture*
  - Leach: 5/6 had injections (2 had multiple)
  - Acevedo/Beskin: 44/51 ruptures had prior injection
  - Increased incidence after two injections
    - Sellman, 1994
Shock Wave Therapy

• High energy vs Low energy
  – Different volume and amount of energy
  – Different depths of penetration
  – High energy requires anesthesia
  – Low energy requires more treatments
Shock Wave Therapy

Either High or Low Energy is worth a try!

- In athlete, low energy requires no downtime (high energy may be at some risk for rupture 6-10 weeks after)
- No significant side effects reported
- Difficult obtaining insurance approval
Plantar Fasciitis

• Surgical treatment a last resort
  – Less than 5% of patients
  – At least 6 months of failed conservative tx
  – Options
  • Plantar fascial release
    – Complete vs. Partial
  • Endoscopic plantar fascial release
  • Mini-open = Tenex/Topaz
  • Distal Tarsal tunnel release
    – Baxter – release of LPN
Distal Tarsal Tunnel Syndrome

- Described in runners
- 1st branch of LPN
  - Mixed motor-sensory
    - Sensation to lateral heel
    - Innervates ADQ
  - Baxter described isolated compression
    - Between deep fascia of abductor and medial fascia of quadratus plantae
  - Differentiate from plantar fasciitis – tender to compression over abductor hallucis muscle
Recalcitrant Heel Pain

- Our preference is to address both plantar fascia and LPN
  - Preserve abductor hallucis muscle
  - Release only medial 50% of plantar fascia
  - NWB x 2 weeks
  - Boot x 4 weeks
Postop

• Return to play when pain allows
  – Typically 3-4 months
  – Use orthotic device with post/wedge
  – Taping
  – Full length turf toe plate
PF Rupture

• Diagnosis
  – Plantar ecchymosis
  – Palpate medial band and compare to contralateral
PF Rupture

• Diagnosis
  – Plantar ecchymosis
  – Palpate medial band and compare to contralateral
PF Rupture

• Diagnosis
  – MRI
    • Disruption at origin
    • Soft tissue inflammation
    • Late hypertrophy
PF Rupture

- Sequalae
  - Loss of arch height → pronation deformity
  - Lateral column foot pain
    - C-C joint synovitis
    - Cuboid stress reaction
PF Rupture

- Sequalae
  - Loss of arch height → pronation deformity
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PF Rupture

• Sequelae
  – Metatarsal stress fractures
PF Rupture

• Treatment
  – Early diagnosis key!
  – Place directly into short leg cast
    • Mold arch
    • WBTT
PF Rupture

• Treatment
  – Serial exams
    • Weekly
    • Recast for tenderness
      – Average 2.5-3.5 weeks
PF Rupture

• Treatment
  – Gortex cast allows for continued rehab/conditioning/pool therapy
PF Rupture

• Treatment
  – Rehab
    • Night splint
    • Toe flexion (strengthening) exercises
    • Gentle windlass stretch
    • Achilles stretching
PF Rupture

• Return to play when pain allows
  – Avg. 4-6 weeks
  – Use orthotic device
  – Taping
  – Full length turf toe plate
PF Rupture

• Return to play
  – Saxena, AMSM ’04
  • 18 athletes
  • RTP at 9 weeks (+/- 6)
Sesamoid Disorders
Anatomy

- Sesamoids of the hallux
  - fibular
  - tibial
- Joined by inter-sesamoid ligament and suspended by MT-sesamoid ligaments
Anatomy

- Delicate balance
- Cross section
  - FHL protected and centralized by the sesamoids
Biomechanics

• Like the patello-femoral joint...
  – Chrondromalacia
  – DJD
  – OCL
  – *Loss of strength with excision*
Pathophysiology

• Acute injury
  • fall from height
  • forced dorsiflexion of hallux mp joint

• Chronic - repetitive stress
  • dancers
  • runners
Imaging

• Radiographs
  – Standing AP/bilateral
  – Axial
  – Oblique (for fx)
  – Use marker

• MRI

• Bone scan
  – Pinhole image

• CT
Diagnoses

- Fracture
  - Acute
  - Stress
- Sesamoiditis
- Chondromalacia
- Osteochondritis dissecans
- Osteonecrosis
  - Fibular > Tibial
Nonoperative Treatment (in general…)

• **Acute**
  – NSAIDs
  – Cast, boot, sandal
  – PT

• **Chronic**
  – Orthosis
  – Shoe with rigid sole/cushion
  – Injection?
  – Bone Stim?
  – Shockwave?
Operative Treatment

Surgical Indications

• Failure of conservative treatment
• Pain/tenderness - localized to one sesamoid
• Diagnostic studies identify abnormality

MT-sesamoid arthrosis
Operative Treatment

Surgical Options

- Sesamoidectomy - total vs. partial
- Plantar shaving, +/- bursextomy
- Bone grafting
- Soft tissue reconstruction
Surgical Approach

- Sesamoidectomy
  - Identify and mobilize digital nerves
  - Repair FHB and volar plate
Case: 20 y/o baseball player with fragmented *tibial* sesamoid
Case: 20 y/o pitcher who felt “pop” running off the mound
Case: 20 y/o pitcher who felt “pop” running off the mound

- MRI confirms fracture of fibular sesamoid
- Flouro helpful
- Increased separation of fragments with DF of hallux
Case: Required reconstruction of the plantar plate with fibular sesamoidectomy
Postop sesamoidectomy

- Non-WB x 2 weeks
- Maintain hallux alignment/protect in boot for 6-8 weeks
- No running for 3 months – orthosis for 6 months
- RTP around 4-5 months
Foul Ball Injuries

- Ankle
  - Malleoli
  - Talus
- Foot
  - Navicular
  - 1st metatarsal
Foul Ball Injuries

- Don’t get too excited
- Can treat nonop unless displaced
Foul Ball Injuries

- Ice/NSAIDs
- Boot, WBTT
- Bone stimulator
- RTP when they can hop x 30 and perform 20+ SLHR
Foul Ball Injuries

• Case example of medial midfoot impaction
  - Tender and swollen over navicular tuberosity
  - PTT intact but pain against resistance
Foul Ball Injuries

• MRI performed
  – Edema in navicular
  – CT negative for fracture
• Placed in boot/arch support with WBTT
• Bone stim
• RTP at 4 weeks with orthosis in shoe
Case

- 33 y/o 1st baseman with foul ball to dorsum of the foot
- Pain and swelling
  - Worse with WB
- Xrays appear normal
Case

- Persistent pain and swelling
- MRI performed
Case

- CT performed
- WB in boot for 4 weeks for nondisplaced fracture of the 1st metatarsal
Case

• Began running in pool at 3 weeks
• Persistent swelling and tenderness
• Repeated CT and MRI at 4 weeks
  – Well healed
  – Hypertrophic?
  – Indocin initiated

RTP at 5 weeks
Stress Fractures

• Occur in all sports
• Navicular most concerning
Navicular Stress Fractures

- Difficult to diagnose
- Have a high suspicion
  - Always a possibility in the running athlete
  - Vague ankle pain without the pathology
  - Xrays often negative
  - Don’t want to miss these!!!
Navicular Stress Fractures

• Imaging
  – Obtain MRI or bone scan early
  – CT mandatory if abnormal
    • Differentiates stress reaction vs. fracture vs. nonunion
Stress Fractures (nondisplaced, incomplete)

- Nonop Treatment
  - Torg et al
  - SLC x 4 weeks; NWB
  - SLWC x 4 weeks
  - Repeat CT

Torg: 89% naviculars healed in 4 months (no CT)
“Incomplete” Stress Fractures

• Beware!
  – I find that these tend to progress to complete fractures or nonunion
    • McCormick et al: AJSM ’12
      – Complete fx with worse prognosis
  – Follow with CT every 6 weeks
  – *I am quick to operate!*
Case

34 y/o pro player with ankle pain

- No injury
- Started in August and gradually getting worse
- Xrays note impingement lesions
Case

34 y/o pro player with ankle pain

• Played thru the playoffs
• MRI performed
Case

34 y/o pro player with ankle pain

- CT noted complete navicular fracture
Case

Surgery

• Open debridement of ankle
• Bone graft and ORIF of navicular
Case

Postop

• NWB in splint/boot for 6 weeks
• WB in boot for 6 weeks
• CT at 12 weeks
• Running at 5 months
• Made Opening Day
Thank You!
Case

24 y/o pro player with ankle injury

- Excessive DF hitting the wall
- Lateral and anterior pain
- Diffuse ecchymosis/swelling
Case

24 y/o pro player with ankle injury

- Negative xrays
- MRI performed same day
Case

Rehabbed

• Peroneal strengthening
• Ankle brace
• Persistent lateral discomfort with activity
  – ‘something slipping’
Case

Seen 2 months after the injury

- Tender along posterior fibula
- Peroneals intact
  - No obvious dislocation
- Anterior impingement sign
Case

Decision made to proceed with surgery

- EUA/Scope
- Peroneal exploration
Operative Treatment: *Chronic Dislocation*

My preferred technique

- Fibular groove deepening
  - Indirect
    - Maintains soft tissue on peroneal floor
    - No osteotomy to heal
Dislocation
Debridement
Groove Deepening: Indirect

Shawen and Anderson *Tech. Foot Ankle Surg.* 2004
Repair
Peroneal Repair with Cavovarus

- Consider realignment osteotomy
  - 1st metatarsal osteotomy
  - Protects reconstruction
Case - Postop

- Early peroneal mobilization while avoiding inversion
- Returned to running at 14 weeks
- Cleared to play at 6 months
Case RR

• 24 y/o MLB pitcher
• Midfoot pain x 10 weeks
  – Denies injury
• No improvement with activity modification, orthoses
• Exam: tender over dorsal midfoot, tight Achilles
Case RR

- Options?
  - Attempt casting?
  - Bone stimulator?
  - Gastroc recession?
  - DBM/BMA (*Ignite*) injection
  - ORIF with grafting (*Ortholoc forefoot plate*)
Case RR

- **Treatment**
  - DBM/BMA (*Ignite*) injection/bone stimulator

- **Rationale:** short on time